

CLAIMS

We claim:

1. A chemical composition comprising the formula:
$$\text{M-SnO}_x \cdot y\text{H}_2\text{O}$$
wherein M is a platinum group metal; and
wherein x and y are positive numbers.
2. The chemical composition of claim 1, wherein M is platinum.
3. The chemical composition of claim 0, wherein composition comprises less than about 30% platinum by weight.
4. The chemical composition of claim 1,
wherein x is about 1 to about 2; and
wherein y is greater than 0 up to about 2.
5. The chemical composition of claim 1, wherein the composition is combined with a conductive support.
6. The chemical composition of claim 5, wherein the combination of the composition and the conductive support comprises at least 20% by weight of the conductive support.
7. The chemical composition of claim 5, wherein the combination of the composition and the conductive support comprises at least 50% by weight of the conductive support.
8. The chemical composition of claim 5, wherein the conductive support is carbon black.
9. The chemical composition of claim 1, wherein the composition is substantially free of silica.
10. An electrode comprising the chemical composition of claim 1.
11. A device comprising:
a cathode comprising a chemical composition comprising the formula:
$$\text{M-SnO}_x \cdot y\text{H}_2\text{O}$$
wherein M is a platinum group metal; and
wherein x and y are positive numbers;
an anode capable of catalytically oxidizing hydrogen; and
an electrolyte in contact with both the cathode and the anode.
12. The device of claim 11, wherein the device is a fuel cell.
13. The device of claim 11, wherein the cathode and the anode are on opposing surfaces of a proton-conducting membrane.

14. The device of claim 13, wherein the proton-conducting membrane comprises a perfluorosulfonic acid polymer.
15. A material comprising:
a conductive support; and
a chemical composition comprising the formula:
$$\text{M-SnO}_x \cdot y\text{H}_2\text{O}$$

wherein M is a platinum group metal; and
wherein x and y are positive numbers.
16. The material of claim 15, wherein the conductive support is conductive carbon.
17. A method of electrochemical reduction comprising the steps of:
providing an a cathode comprising a chemical composition comprising the formula:
$$\text{M-SnO}_x \cdot y\text{H}_2\text{O}$$

wherein M is a platinum group metal; and
wherein x and y are positive numbers;
providing an anode; and
contacting a substance to be reduced to the cathode.
18. The method of claim 17, wherein the substance to be reduced is oxygen.